

WHAT IS CLAIMED IS:

1. A method for constructing a color gamut for a plurality of colorants used in a color image reproduction system, comprising the steps of:

establishing a forward model for the color image reproduction system, the forward model characterizing the correspondence between combinations of the plurality of colorants and resulting colors in color space;

generating a set of inkvectors defining combinations of colorants in colorant space;

using the forward model to map the set of inkvectors into said color space; and

selecting a subset of the mapped set of inkvectors that define boundaries of the color gamut.

2. A method according to claim 1, comprising a further step of identifying at least one color in a color image to be reproduced that is outside the boundaries of the color gamut.

3. A method according to claim 2, comprising mapping the at least one identified color to produce a color that is on or inside the boundaries of the color gamut.

4. A method according to claim 3, comprising a further step of reproducing the color image on the color image reproduction system.

5. A method according to claim 1, wherein establishing the forward model comprises:

generating a plurality of test patches on a medium, each test patch corresponding to a specific combination of colorants;

measuring a color value for of each of the test patches; and

fitting the color values to a suitable basis function.

6. A method according to claim 5, wherein the color value is measured using a spectrophotometer.

7. A method according to claim 6, wherein the color value is measured in CIELAB color space.

8. A method according to claim 1, wherein the colorants comprise printing inks.

9. A method according to claim 1, wherein the colorants comprise xerographic toners.

10. A method according to claim 1, wherein each inkvector comprises two colorants that are allowed to vary freely between their respective minimum and maximum values, the remaining colorants being fixed at one of a maximum or a minimum value.

11. A method according to claim 10, wherein the set of inkvectors comprise all possible combinations of the plurality of colorants.

12. A method according to claim 1, wherein the boundaries of the color gamut are constructed for each of a plurality of planes of constant lightness in said color space.

13. A method according to claim 12, wherein a plurality of boundary nodes are identified for each plane of constant lightness, the method further comprising the step of determining a plurality of intervening points between adjacent pairs of the plurality of boundary nodes.

14. A method according to claim 1, comprising:

establishing a lightness range for each of the of the mapped set of inkvectors in said color space:

identifying a subset of the mapped inkvectors that have an intersection with a plane of constant lightness;

establishing a set of nodes in color space corresponding to said intersection; and

selecting a subset of the set of nodes that define boundaries of the color gamut.

15. A method according to claim 1, wherein the plurality of colorants comprise at least three colorants.

16. A method according to claim 1, wherein the plurality of colorants comprise less than eight colorants.

17. A general purpose computer processor configured to perform the method of claim 1.

18. A color image reproduction system having a plurality of colorants, the color image reproduction system comprising:

an output device for expressing color on a medium;

means for establishing a forward model for the color image reproduction system, the forward model characterizing the correspondence between combinations of the plurality of colorants and resulting colors in color space;

means for generating a set of inkvectors defining combinations of colorants in colorant space;

means for using the forward model to map the set of inkvectors into said color space;  
and

means for selecting a subset of the mapped set of inkvectors that define boundaries of a color gamut for the color image reproduction system.

19. A color image reproduction system according to claim 18, further comprising means for identifying at least one color in a color image to be reproduced that is outside the boundaries of the color gamut.

20. A color image reproduction system according to claim 18, wherein the output device comprises an inkjet printer and the colorants are inkjet printing fluids.

21. A color image reproduction system according to claim 18, wherein the output device comprises a xerographic printer and the colorants are toners.

22. A color image reproduction system according to claim 18, wherein the output device comprises a printing press and the colorants are printing inks.

23. A color management system according to claim 18, wherein the output device is used to produce a color proof of a color image.

24. A computer program product for constructing a color gamut for a plurality of colorants used in a color image reproduction system, the computer program product comprising a computer readable storage medium having a computer program stored thereon for performing the steps of:

establishing a forward model for the color image reproduction system, the forward model characterizing the correspondence between combinations of the plurality of colorants and resulting colors in color space;

generating a set of inkvectors defining combinations of colorants in colorant space;

using the forward model to map the set of inkvectors into said color space; and

selecting a subset of the mapped set of inkvectors that define boundaries of the color gamut.

25. A computer readable medium having computer readable instructions for performing steps to construct a color gamut for a plurality of colorants used in a color image reproduction system, comprising steps for:

establishing a forward model for the color image reproduction system, the forward model characterizing the correspondence between combinations of the plurality of colorants and resulting colors in color space;

generating a set of inkvectors defining combinations of colorants in colorant space;

using the forward model to map the set of inkvectors into said color space; and

selecting a subset of the mapped set of inkvectors that define boundaries of the color gamut.